Tesoro Los Angeles Refinery Integration and Compliance Project
Attachment D: Summary of Emissions Increases - Post-Project Potential Emissions for New and Modified Units
Facility: Carson and Wilmington

Constants

O2 Conc (Heaters)	3	percent (dry)
O2 Conc (Cogen)	15	percent (dry)
F-factor	8710	dscf/mmbtu (40 CFR 60 App A Meth. 19)
NOx Conc Conv Factor	1.19E-07	ppm to lbs/scf (40 CFR 60 App A Meth. 19)
Fuel HHV	1026	btu/scf (natural gas; 40 CFR 98 default)
Operating Hours	24	hrs/day
Operating Hours	365	days/year
Ideal Gas Constant	385.24	scf/lbmol @ 68 F

Emission Factors

SOx EF	0.6	lbs/mmscf (AER Default Factor)
CO EF	35	lbs/mmscf (AER Default Factor' ~0.033 lbs/mmbtu)
PM EF	7.5	lbs/mmscf (AER Default Factor)
VOC EF	7	lbs/mmscf (AER Default Factor)

Sulfuric Acid Plant Process Air Heater (LARW)

Max Firing Rate	20	mmbtu/hr
HHV NG	1026	mmbtu/mmscf

Assumptions: NG

	Daily Controlled lbs/day	Annual lbs/yr	
NOx (SSC)	--	3,042.48	
NOx (Routine)	6.99	2,552.88	12 ppmv NOx
SOx	0.28	102.46	AER default for NG.
CO	16.37	5,976.61	AER default for NG.
PM	3.51	1,280.70	AER default for NG.
VOC	3.27	1,195.32	AER default for NG.
H2SO4	0.01	3.98	see Attachment K

- Startup, Shutdown and Comissioning (SSC) includes "routine" operations as well as maximum startup, shutdown and commssioning/refractory dryout emissions.
- NOx (Routine) is representative of "normal" operations.

SSC Hours:	720	hours/year
NOx SSC EF:	40	ppmv
NOx SSC EF (calculated)	0.048570853	lb/mmbtu
NOx SSC Emissions:	0.971417055	lbs/hr (max)

Sulfuric Acid Plant Decomposition Furnace (LARW)

Max Firing Rate	42	mmbtu/hr
HHV NG	1026	mmbtu/mmscf

Assumptions: NG w/SCR

	Daily Controlled lbs/day	Annual lbs/yr	
NOx (SSC)	--	2,288.85	
NOx (Routine)	2.45	893.51	2 ppmv NOx
SOx	0.59	215.16	AER default for NG.
CO	34.39	12,550.88	AER default for NG.
PM	7.37	2,689.47	AER default for NG.
VOC	6.88	2,510.18	AER default for NG.
H2SO4	0.03	9.18	see Attachment K

- Startup, Shutdown and Comissioning (SSC) includes "routine" operations as well as maximum startup, shutdown and commssioning/refractory dryout emissions.
- NOx (Routine) is representative of "normal" operations.

SSC Hours:	720	hours/year
NOx SSC EF:	40	ppmv
NOx SSC EF (calcu	0.048570853	lb/mmbtu
NOx SSC Emission	2.039975815	lbs/hr (max)

Sulfuric Acid Plant Converter Heater (LARW)

Max Firing Rate	5	mmbtu/hr
HHV NG	1026	mmbtu/mmscf

Assumptions: NG

	Daily Controlled lbs/day	Annual lbs/yr	
NOx (SSC)	--	760.62	
NOx (Routine)	1.75	638.22	12 ppmv NOx
SOx	0.07	25.61	AER default for NG.
CO	4.09	1,494.15	AER default for NG.
PM	0.88	320.18	AER default for NG.
VOC	0.82	298.83	AER default for NG.
H2SO4	0.00	1.00	see Attachment K

- Startup, Shutdown and Comissioning (SSC) includes "routine" operations as well as maximum startup, shutdown and commssioning/refractory dryout emissions.
- NOx (Routine) is representative of "normal" operations.

SSC Hours:	720	hours/year
NOx SSC EF:	40	ppmv
NOx SSC EF (calc	0.048570853	lb/mmbtu
NOx SSC Emissio	0.242854264	lbs/hr (max)

Sulfuric Acid Plant Process Vent Emissions (LARW)

Max Firing Rate	NA	mmbtu/hr
HHV NG	NA	mmbtu/mmscf

Assumptions: Associated with Decomp Furnace Stack

	Daily Controlled lbs/day	Annual lbs/yr	
NOx (SSC)			
NOx (Routine)			
SOx	31.12	11,356.99	see Attachment K
CO			
PM			
VOC			
H2SO4			see Attachment K

Sulfuric Acid Plant Total Emissions (LARW)

	Daily Controlled lbs/day	Annual lbs/yr	Annual tpy	
NOx (SSC)	--	6,091.95	3.05	
NOx (Routine)	11.19	4,084.61	2.04	
SOx	32.06	11,700.22	5.85	
CO	54.85	20,021.64	10.01	
PM	11.75	4,290.35	2.15	
VOC	10.97	4,004.33	2.00	
H2SO4	0.04	14.16	**0.01**	see Attachment K

Tesoro Los Angeles Refinery Integration and Compliance Project
Attachment D: Summary of Emissions Increases - Post-Project Potential Emissions for New and Modified Units
Facility: Carson and Wilmington

NHDS Heater (D1433) Post-Mod PTE

Max Firing Rate	12.5	mmbtu/hr
HHV NG	1026	mmbtu/mmscf

Assumptions: NG w/ULNB

	Daily Controlled lbs/day	Annual lbs/yr	
NOx (SSC)	--	1,901.55	
NOx (Routine)	4.37	1,595.55	ULNB (12 ppmv)
SOx	0.66	240.90	2002 Application
CO	10.23	3,735.38	AER default for NG.
PM	6.00	2,190.00	permit condition
VOC	1.92	700.80	permit condition
H2SO4	0.03	9.37	see Attachment K

- Startup, Shutdown and Comissioning (SSC) includes "routine" operations as well as maximum startup, shutdown and commssioning/refractory dryout emissions.
- NOx (Routine) is representative of "normal" operations.

SSC Hours:	720	hours/year
NOx SSC EF:	40	ppmv
NOx SSC EF (calculated)	0.048570853	lb/mmbtu
NOx SSC Emissions:	0.607135659	lbs/hr (max)

HCU H-300 Post-Mod PTE

Max Firing Rate	65.1	mmbtu/hr
HHV NG	1026	mmbtu/mmscf

Assumptions: NG w/SCR

	Daily Controlled lbs/day	Annual lbs/yr	
NOx (SSC)	--	5,454.39	
NOx (Routine)	9.49	3,462.35	5 ppmv NOx
SOx	0.91	333.49	AER default for NG.
CO	53.30	19,453.86	AER default for NG.
PM	11.42	4,168.68	AER default for NG.
VOC	10.66	3,890.77	AER default for NG.
H2SO4	0.04	14.23	see Attachment K

- Startup, Shutdown and Comissioning (SSC) includes "routine" operations as well as maximum startup, shutdown and commssioning/refractory dryout emissions.
- NOx (Routine) is representative of "normal" operations.

SSC Hours:	720	hours/year
NOx SSC EF:	40	ppmv
NOx SSC EF (calcu	0.048570853	lb/mmbtu
NOx SSC Emission	3.161962513	lbs/hr (max)

HCU H-301 Post-Mod PTE

Max Firing Rate	31	mmbtu/hr
HHV NG	1026	mmbtu/mmscf

Assumptions: NG w/SCR

	Daily Controlled lbs/day	Annual lbs/yr	
NOx (SSC)	--	2,597.33	
NOx (Routine)	4.52	1,648.74	5 ppmv NOx
SOx	0.44	158.81	AER default for NG.
CO	25.38	9,263.74	AER default for NG.
PM	5.44	1,985.09	AER default for NG.
VOC	5.08	1,852.75	AER default for NG.
H2SO4	0.02	6.77	see Attachment K

- Startup, Shutdown and Comissioning (SSC) includes "routine" operations as well as maximum startup, shutdown and commssioning/refractory dryout emissions.
- NOx (Routine) is representative of "normal" operations.

SSC Hours:	720	hours/year
NOx SSC EF:	40	ppmv
NOx SSC EF (calc	0.048570853	lb/mmbtu
NOx SSC Emissio	1.505696435	lbs/hr (max)

51 Vac Heater (D63) Post-Mod PTE

Max Firing Rate	360	mmbtu/hr
HHV NG	1050	mmbtu/mmscf

Assumptions: NG w/SCR

	Daily Controlled lbs/day	Annual lbs/yr	
NOx (SSC)	--	44,220.85	
NOx (Routine)	94.42	34,463.93	9 ppmv NOx
SOx	4.94	1,802.06	AER default for NG.
CO	247.00	90,155.00	Calc'd by AQMD
PM	53.00	19,345.00	Calc'd by AQMD
VOC	50.00	18,250.00	Calc'd by AQMD
H2SO4	0.21	76.71	see Attachment K

CO EF:	29.6	lbs/mmscf (applied by AQMD)
PM EF:	6.3	lbs/mmscf (applied by AQMD)
VOC EF:	5.9	lbs/mmscf (applied by AQMD)

- CO, PM and VOC emission factors provided by SCAQMD.
- CO, PM and VOC emissions rounded "up" to the nearest whole number.

- Startup, Shutdown and Comissioning (SSC) includes "routine" operations as well as maximum startup, shutdown and commssioning/refractory dryout emissions.
- NOx (Routine) is representative of "normal" operations.

SSC Hours:	720	hours/year
NOx SSC EF:	40	ppmv
NOx SSC EF (calculate	0.05	lb/mmbtu
NOx SSC Emissions:	17.49	lbs/hr (max)

DCU H-100 Post-Mod PTE

Max Firing Rate	302.4	mmbtu/hr
HHV NG	1230	mmbtu/mmscf

Assumptions: RFG w/SCR

	Daily Controlled lbs/day	Annual lbs/yr	
NOx (SSC)	--	87,220.49	
NOx (Routine)	181.44	66,225.60	
SOx	250.00	91,250.00	
CO	178.00	64,970.00	Calc'd by AQMD
PM	38.00	13,870.00	Calc'd by AQMD
VOC	36.00	13,140.00	Calc'd by AQMD
H2SO4	10.66	3,892.66	see Attachment K

CO EF:	29.6	lbs/mmscf (applied by AQMD)
PM EF:	6.3	lbs/mmscf (applied by AQMD)
VOC EF:	5.9	lbs/mmscf (applied by AQMD)

- CO, PM and VOC emission factors provided by SCAQMD.
- CO, PM and VOC emissions rounded "up" to the nearest whole number.

- Startup, Shutdown and Comissioning (SSC) includes "routine" operations as well as maximum startup, shutdown and commssioning/refractory dryout emissions.
- NOx (Routine) is representative of "normal" operations.

SSC Hours:	720	hours/year
NOx SSC EF:	100	ppmv
NOx SSC EF (cal	0.12	lb/mmbtu
NOx SSC Emissic	36.72	lbs/hr (max)

NOx (Routine) (Daily): Emissions based on R1109 EF of 0.03 lb/mmbtu and 252 mmbtu/hr (previous described firing rate).
SOx (Daily): Max daily emissions assumed to be 250 lbs/day (based on historical operating data).
SOx (Hourly): Max hourly emissions assumed to be 22 lbs/hr (based on historical operating data).